NUMBER FOUR NOTES FROM THE SHOP

Woodsmith™

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Woodsmith

Number Four July, 1979

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Talking Shop

ABOUT THIS ISSUE

There are three things I'd like to mention about this issue. First, all of the projects shown were made from good, old No. 2 construction Pine. I go to a lumber yard where they allow me to choose the wood I want. So, naturally I choose lengths (usually 4' or 6') that are almost clear to begin with. Then, when building small projects like the ones in this issue, I cut around the knots and have clear pine for much less cost.

Second, I've based the dimensions of these projects on standard dimension boards. That will prevent wasting a lot of wood to build them, and makes things easier all around.

Having said that, I'm going to make a slight exception. Whenever I use dimension boards (1x4, 1x6, etc.) I usually rely on the thickness being relatively constant (and it usually is). But the width does vary from board to board. A 1x4 should be 3½" wide but it can vary as much as ¼". So, I rip the boards to a constant width. This usually means just taking a hair off the edges. But then I know I'm working with boards all the same width.

Third, I enjoy building things. Not just the project itself, but the little things like handles, pulls, holders, etc. To some this may seem like a lot of unnecessary work . . . it's easier to just go out and buy what you need. But, I enjoy it, so I thought I'd go ahead and show these little things anyway.

I said three things, but I'm going to add a fourth. All of the projects shown in this issue are unfinished (except for the bread box). You really don't have to finish any of them if you don't want to.

Since they're adequate unfinished, it allows the opportunity to test out some finishing techniques you haven't tried before. For instance, on the box of drawers shown on page 5, you could stain each of the drawers a different shade. (Do the backs if you don't want to do the front.) Then finish them with varnish or oil to test the effect on the final color. You might even want to keep some notes so you can refer to them later when you want to finish a larger project. And, you'll also see what happens to the color and finish with age.

LOOKS AREN'T EVERYTHING

"Looks aren't everything, but they sure can help." That phrase might apply more aptly to a movie star than it does to a woodworking newsletter, but I wanted to comment about the "looks" of *Woodsmith.* I've received several letters from readers commenting that *Woodsmith* looks very nice, clean, and easy to read. That is due, in large part, to the efforts of Jon Snyder.

Jon helped a great deal with the graphic design of *Woodsmith.* That involves choosing the color of the paper and ink, deciding on the style of type used (it's Century Expanded for the body text, Goudy for the headlines, and Futura for the subheads), and, most important, setting up a grid system. The grid system helps me (and you) know in advance where and how large the headlines, photos, and drawings are going to be.

Jon also designed the *Woodsmith* logo, seen on the cover. It's set with a typeface called Goudy hand-tooled. I like it because it has a hand-carved look. And someday I'll get around to carving the logo in wood.

Well, that's enough about "looks", hope you enjoy the information, too.

NEXT MAILING: September,1979.

LETTERS

Dear *Woodsmith:*
I plan to build bar stools, but I need a little information. I need either a jig or tool to put on my drill press to drill the holes at the correct angle. Can you provide the answer?

Dave Conrad
Sunbury, PA

Dave, your letter prompted me to rearrange this issue a little and add two pages on angle drilling. Pages 10 and 11 should answer your question.

Dear *Woodsmith:*
I enjoy *Woodsmith* tremendously. I am a very naive beginner in the woodcraft arena, and one of my biggest problems is the collection of information and books on the proper use of basic hand and power tools, as well as basic woodworking techniques.

Dickson Fairback III
Schnecksville, PA

The answer to your needs is Woodsmith. *(Forgive me, I had to say it.) But that's exactly the reason I started* Woodsmith. *The best book I've seen so far on power tool techniques is:* De Cristoforo's Complete Book Of Power Tools, *Popular Science/Harper & Row, $13.95. R. J. De Cristoforo is a master at building jigs and his book proves it.*

Router Case

A TAKE-ALONG CASE FOR ROUTER AND ACCESSORIES

Woodworking is sometimes like a chess game: you have to plan several steps in advance to assure success. This router case is a good example.

To start, plan the *inside* dimensions of the case to fit your router. (The dimensions shown below fit a 1 hp *Craftsman* router.) The width should be at least 2" wider than the width of the router at the handles, the height should be 2" higher than the router, and the depth should be 3" more than the diameter of the router's base plate.

Plan the cutting and assembling so you have the least problems. If you rabbet both ends of the top and bottom pieces (instead of using butt joints), it's much easier to cut the rabbets for the plywood front and back.

Assembly is based on a simple technique that ensures an exact fit: build an enclosed box, then cut it in half. But this technique requires that you plan where your cut is going to be so you don't put any nails along the kerf line.

Place the router's base on the *bottom* piece (B), using the base as a template to draw a semi-circle. I positioned it 1" from the back edge to allow for the cord, and 2" from the front edge to allow for the bit holder.

Mark where the kerf will be on all four sides, then glue and nail them together, spacing the nails to avoid the kerf.

Next cut ¼" plywood inserts to fit snugly in the rabbet in the front and back, and glue and nail them in place.

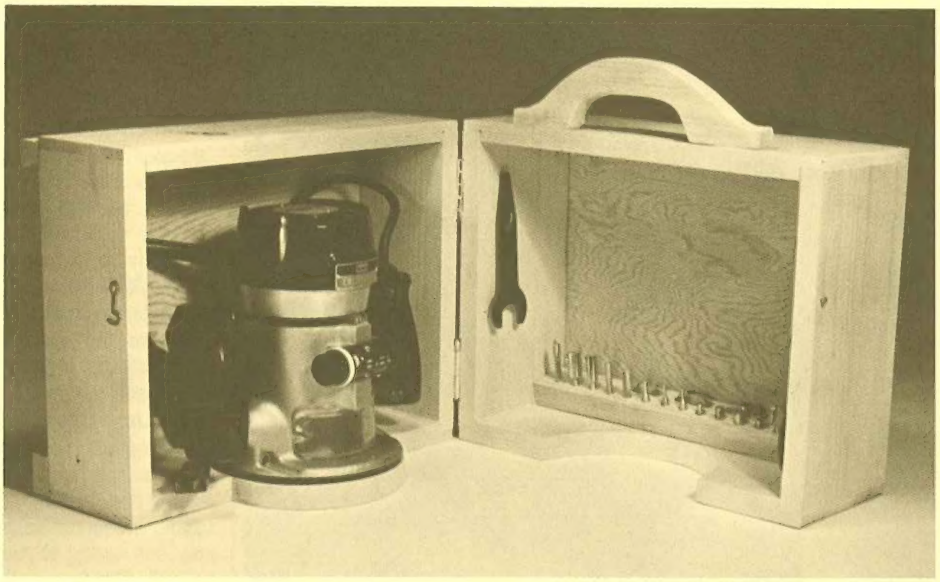
Once the enclosed box is built, cut three of the sides on a table saw. (These are rip cuts.) The bottom (with the semi-circle) is cut with a sabre saw. Join the two halves with hinges and mount a clasp.

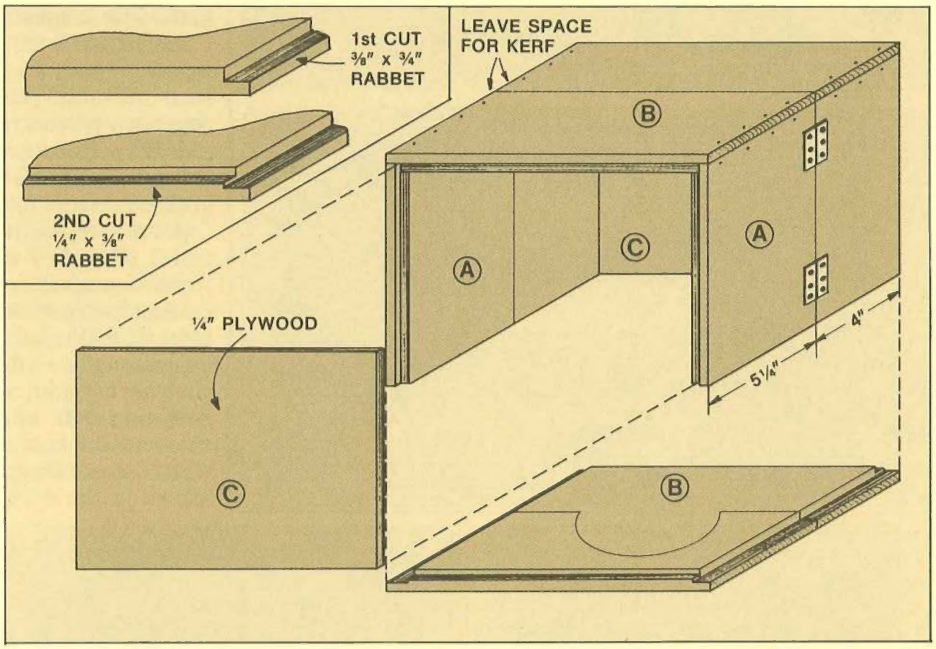
Plan ahead on the bit holder, too. First, drill 9/32" holes in a piece of 2x4 scrap for the bits with a shank. For bit with no shank (like a cove bit), drill a series of ½" holes and chisel them square. Then rip off the top of the 2x4 at 10° so the bit holder tilts forward. Add L-hooks to hold the collet wrench, bushing, and other attachments. To hold the router in place, cut a circle out of ¼" plywood and mount it to the bottom.

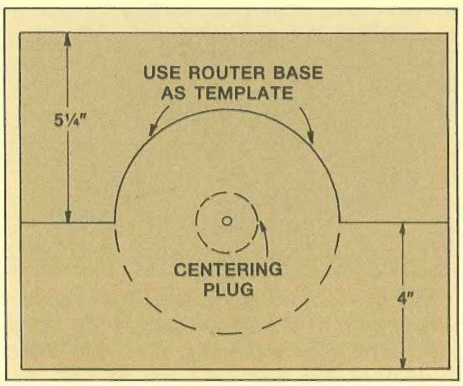
MATERIALS LIST

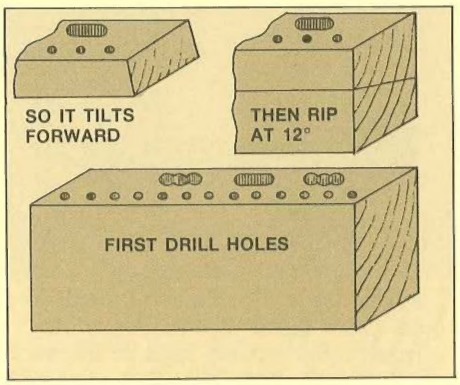
Code	Piece	Dimensions
A	Sides	¾ x 9¼ - 13½
B	Top and Bottom	¾ x 9¼ - 10
C	Front and Back	¼ x 9¼ - 12¾

Misc.: two hinges, clasp, Rh screws.



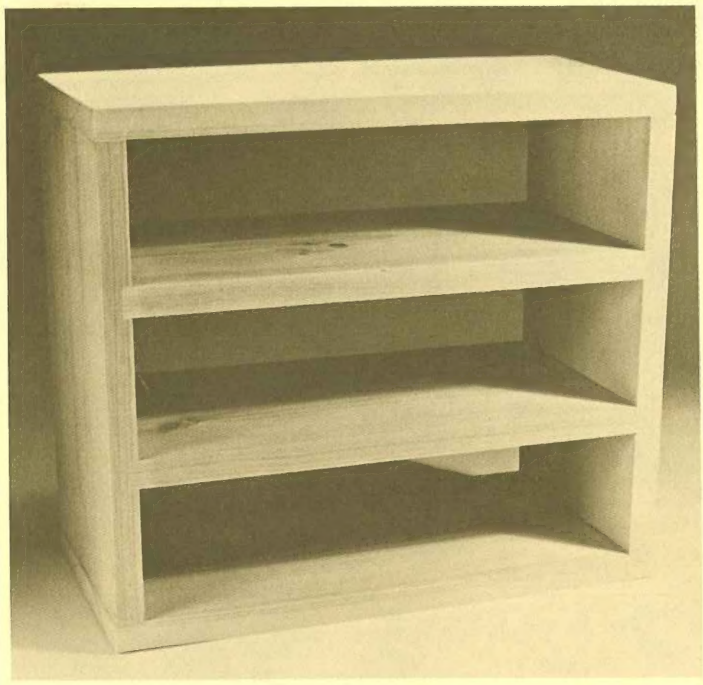


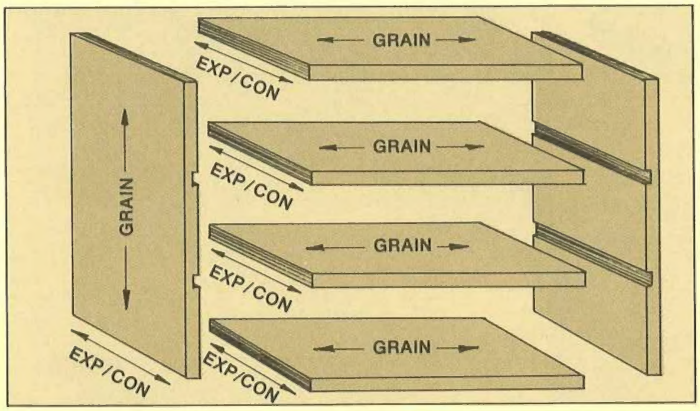




Box Building Basics

STEP-BY-STEP FOR A SIMPLE BOX





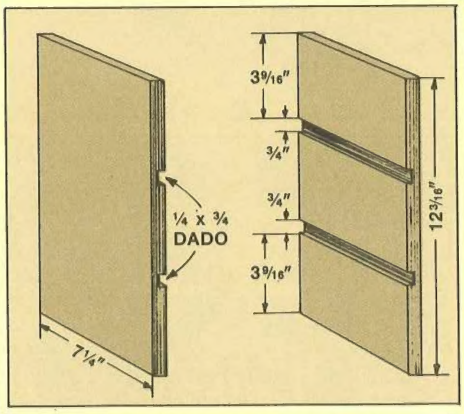
A friend once asked me: "How do you decide what order to cut the wood so everything fits properly?" A good question. The answer to that question, of course, varies from project to project. But I thought I'd use a simple box of drawers to point out a few of the guidelines that I follow.

INSIDE VS. OUTSIDE DIMENSIONS. First I determine which dimensions are most important. The carcass (or frame) of a project can be built to specific *inside* dimensions or specific *outside* dimensions, or both. Using the box of drawers as an example, if I want the drawers to be a certain size, I build to the inside dimensions of the carcass. The opposite procedure is used when the carcass has to fit a specific space and the size of the drawers can vary (as with kitchen cabinets).

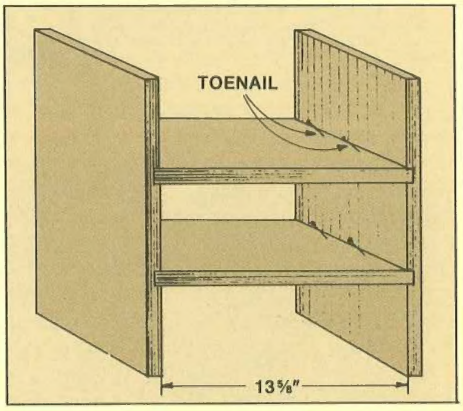
ELIMINATE THE VARIABLES. Before cutting the wood to length I eliminate as many variables as possible right from the beginning. Since both softwoods and hardwoods come surfaced to standard thicknesses, thickness is usually not a problem. Next comes width. I rip all of the wood at the same time to the width I need to prevent variations due to realigning the rip fence. Even if I'm going to use dimension lumber (or boards), I run the wood through the saw to make sure all pieces are exactly the same width before cutting to length. With thickness and width a constant, all I have to worry about is length.

DIRECTION OF THE GRAIN. Before I start cutting pieces to length, I check the assembly diagram to make sure the grain of each individual piece is going in the right direction. Since wood expands and contracts according to seasonal changes in humidity, I make sure each piece expands and contracts in the same direction. The exp/con rate of wood is greatest across the grain and least (almost negligible) with the grain.

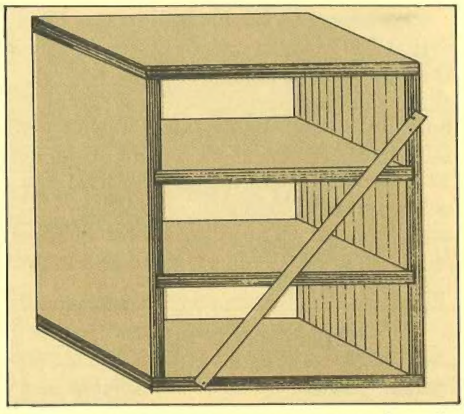
CUTTING TO LENGTH. Okay, I've gone through all that, now which piece do I cut first? I've found the best procedure is to think through the assembly steps first. In most cases I start the cutting in the order I'm going to assemble. I also use the "If I blow it" method. For example, the width of the box shown here depends on two cuts: the depth of the dado and the length of the shelves. I would cut the dado first. If it's a little deeper or shallower than what I need (in other words, if I blow it), I can then cut the shelves a tad longer or shorter to get the exact width I need. The procedure I followed for the box of drawers is shown in the drawings below.



I wanted the drawers a certain size, so I built to the inside dimensions of the carcass. After cutting sides to length, I cut dadoes same distance from each end.



Once the dadoes were cut, I could adjust the length of the shelves to get the width I needed. For assembly, shelves are toenailed into the dadoes with brads.



Top and bottom pieces are cut to length. Before glue set I checked the square of the box. Then tacked strips, as shown, to hold the box in place while glue dried.

Box Of Drawers

BASICS OF BUILDING DRAWERS

The box of drawers shown here has nine drawers, all the same size. But it's easy to expand this unit for more drawers, or build double-width drawers for larger items.

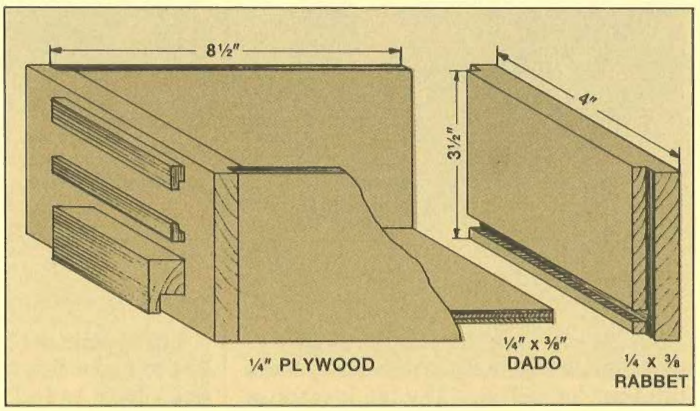
BUILDING THE DRAWERS. I designed these drawers so they would hold a standard one-pound box of nails. The drawing at right shows basic drawer construction. There are probably a zillion different ways to build drawers. (Well, at least a dozen.) The front and back of the drawer is usually rabbeted to hold the sides in place, and a dado is cut ¼" from the bottom edge to accept the bottom of the drawer.

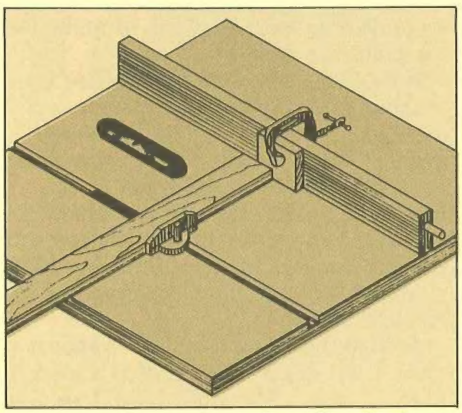
The most important aspect of building *these* drawers is to make things easy on yourself. Before cutting the wood to length, send the 1x4 stock through the saw to make sure it's 3½" wide. While the rip fence is set up, cut strips of plywood for the sides and bottom to the same width. This way you know everything will be exactly the right size.

There are nine fronts and nine backs for the drawers of this unit, 18 pieces all the same size. Rather than measuring the length each time, it's a lot easier (and more accurate) to spend a little time to set up a cutting jig. This is shown in the first drawing below. You never want to use the miter gauge and the rip fence at the same time. But you can clamp a block to the fence and use it as a stop to cut off several lengths. The block allows a free space between the blade and the fence so the lengths won't bind between them. The same procedure is used to cut the sides and bottom to length.

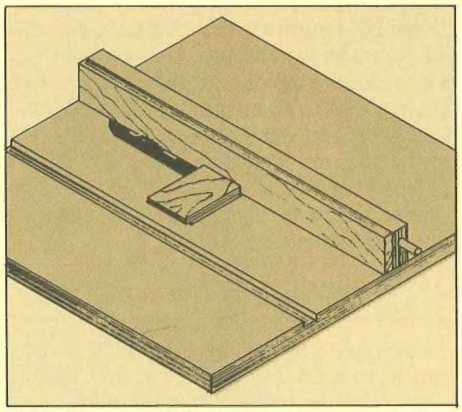
THE HANDLE AND CARD HOLDER. Some might call me cheap, but I like to think that I just like the challenge of building without spending a lot of extra money. That's why I made the handles and card holders out of scrap wood. I made the handles by cutting a ½"x½" rabbet along both edges of some scrap 1x4. Then I ripped 1¼" widths, and cut those to 3" lengths.

The card holders were more of a challenge than an economy. I ripped a strip of ¼" plywood 1¼" wide. By lowering the blade so it barely cut off the bottom ply of the plywood, and adjusting the rip fence with each pass, I cut a 3/4"-wide dado along the center of the strip. Once that dado was cut, I ripped the strip down the middle, and then cut off 3" lengths. These lengths were spaced to accommodate 1"-wide cards, and nailed to the drawer front. (An easier method is to simply use a piece of masking tape, but that's not as much fun.)

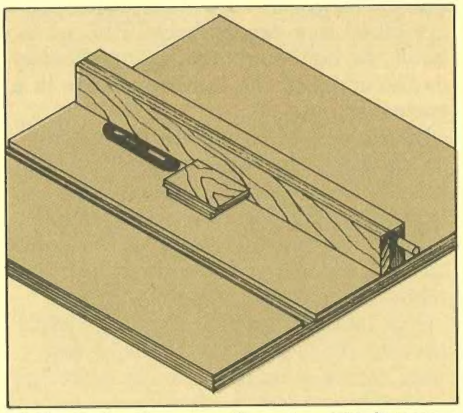




Clamp a block of wood to the rip fence, then adjust the fence so the block is the desired distance (4") from the blade. Slide the wood up to the block and cut off.



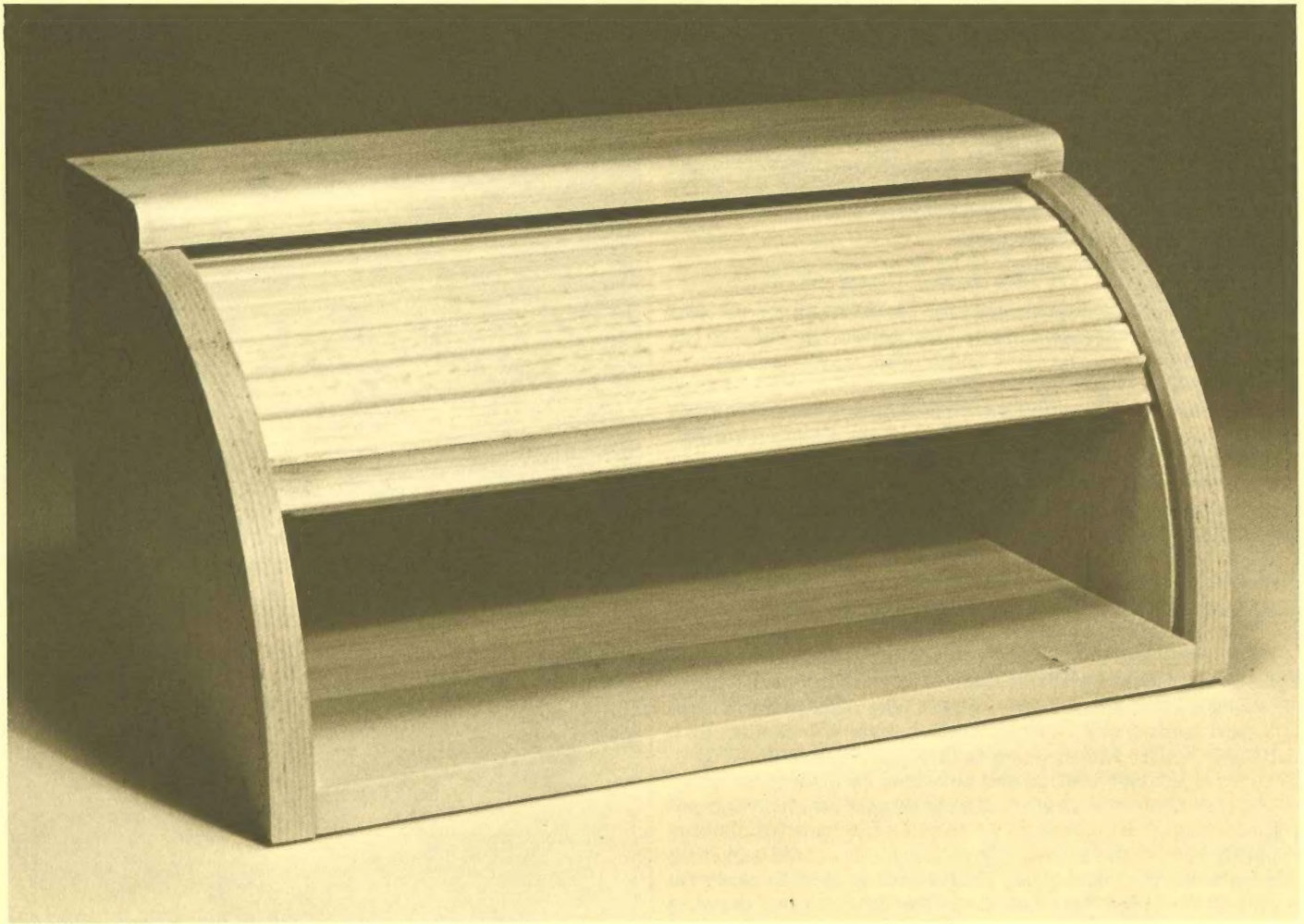
Attach a wood facing to the metal rip fence so there's no danger of the metal touching the blade. Adjust the dado head to cut a ¼"x¼" rabbet on both ends.



Adjust the fence so there's a ¼" distance between the wood facing and the right edge of the dado blade. Then cut a ¼" dado, ¼" deep, along the bottom edge.

Roll-Top Bread Box

AN EASY-TO-MAKE VERSION OF THE CLASSIC ROLL-TOP



How does it work? That's the first question everyone asks when they see a tambour (or roll) top. The top is made of narrow strips of wood (tambours) which are glued to a canvas back. The canvas holds the tambours together and "bends" as the edges of the tambours slide in a curved groove.

Roll-tops have a certain mystique about them. Almost every woodworker I know want to build a roll-top desk (someday). But that's a major undertaking. This bread box affords the chance to build a tambour top without having to build a whole desk underneath it.

I've taken a few liberties to simplify the construction of the tambour top. I used screen bead (a standard molding available at most lumber yards) for the tambours. But before getting to the assembly of the tambours, you'll want to cut pieces for the carcass to rough dimensions.

I used plain old No. 2 Construction Pine 1x4 to make this box. It's cheap, and you don't have to feel bad if you make a mistake. Cut six 9″ lengths for the sides, three 18″ lengths for the bottom, and two 19″ lengths for the top. Use a jointer, or rip a clean edge on the 1x4s before edge-gluing them. Then plane and sand all surfaces, and cut the bottom edge of the sides square. (The Materials List shows the final dimensions of these pieces.) Now you're ready to make the template for routing the curved groove.

MAKING THE TEMPLATE

The purpose of the template is to guide a router to cut a 3/8″ curved groove in both sides. Before making the template, you should have a 3/8″ straight bit and a template guide (bushing) for your router.

Buy the template guide before making the template because you neeed to know its height (or how far it extends down from the router's base) so you can make the template of material at least that thick. And, you have to know the O.D. (outside diameter) in order to make the template the right size.

Note: The directions that follow for making the template also include directions for drawing the tambour groove. This is really not necessary, all you really need is the outline of the template. But, it helps to see where the tambour groove will be cut. It also helps to first draw all of this on a piece of paper, then make the final drawing on particle board.

A diagram of the template is shown at right. First draw a base line on a piece of particle board. Mark off a 10¼″ section (shown as line A-B). Measure *down* 3/4″ from that line and draw another line exactly parallel to line A-B.

Now for the front curve. The diagram

shows the 3/8" tambour groove, and the outline of the template (shaded dark brown). The radius to the *outside* of the *tambour groove* is 7", and since it's a 3/8" groove, the *inside* radius is 6-5/8".

To determine the radius of the *template curve* use this formula: one-half of the O.D. of the template guide minus one-half the O.D. of the straight bit.

The template guide I used has a 5/8" O.D., and the bit is 3/8". So, 5/16" (half of 5/8") minus 3/16" (half of 3/8") equals 1/8". Thus, the template must be 1/8" *less* in diameter than the *inside* of the tambour curve. Subtract 1/8" from 6-5/8" to get the radius of the template curve — 6-1/2". (This measurement has a * next to it on the diagram at the bottom of the page. If you use a template with a different O.D., any measurement marked with * will change according to the formula above.)

The pivot point for the front arc is Point C, located 3" from Point A. Use a compass to draw the arcs, or drive a small brad at Point C and run a string from the brad to the point of a pencil.

When the arcs are drawn, draw a line straight up from Point C so it intersects all three arcs. Where it intersects the outside arc is marked Point D. Extend all three arcs straight back, that is, perpendicular to line C-D.

Now you have to draw a second set of arcs where the tambour will curve down the back side of the box. The pivot point for these arcs is 2" down from Point D and 5/8" back from line C-D. (Point E)

Draw a 2" radius arc from the outer line and a 1-5/8" radius arc from the middle line. The radius for the inner arc (the template arc) is determined again by the formula given above. Whatever that amount was (in my case it was 1/8"), subtract it from the radius of the inner arc (1-5/8" minus 1/8" equals 1-1/2"). Draw this arc.

The last step is to draw lines from these arcs to the bottom line. The connecting lines should be located 2-5/8" and 2¼" from Point C, and (for the template arc) 2" from Point C.

Check over the template. The outside arc should be 7-3/4" from bottom to top, and 9-5/8" wide. Note: the bottom line A-B is 10¼" long. This measurement includes ¼" at the front and 3/8" at the back.

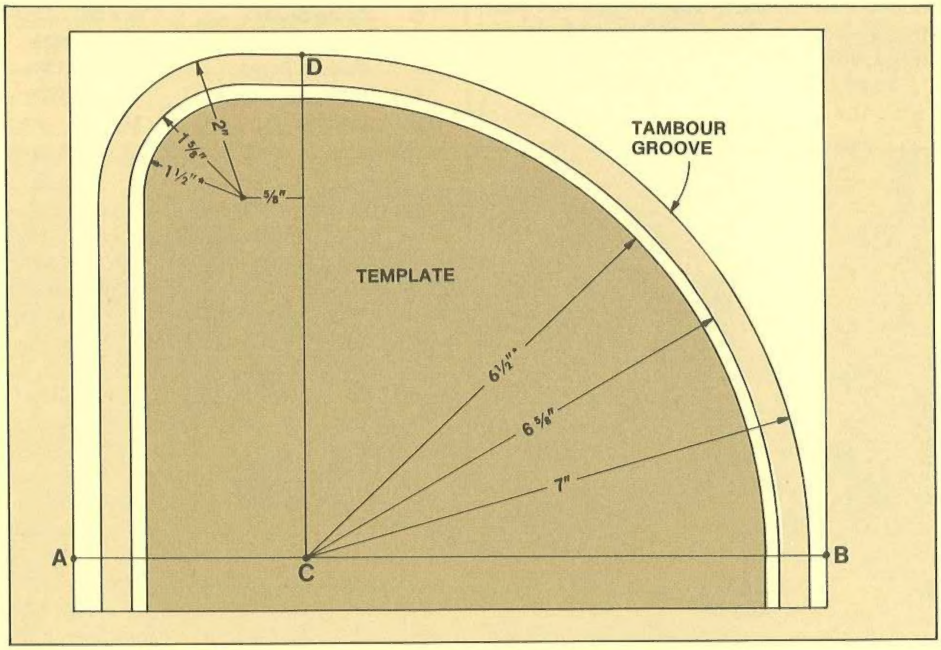
You're past the hard part now. The rest is down hill (sort of). Cut out the template and sand the edges smooth. Any imperfections in the template will be transferred to the final cut in the sides, so make sure it's smooth.

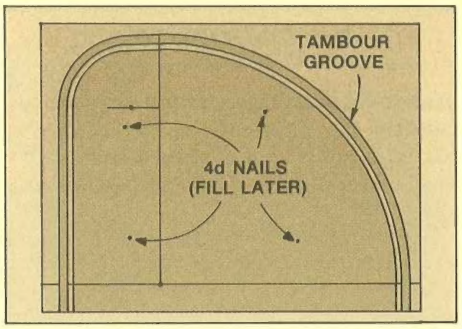
CUTTING THE CURVED GROOVE

It's a good idea to attach the template to a piece of scrap 1x10 or plywood and make a practice cut to get the feel of things. When you attach the template to the inside face of the side pieces, use 4d finishing nails. Nail through the template, the side, and into a solid surface. (This, of course, will leave holes in the side piece, so fill them later.)

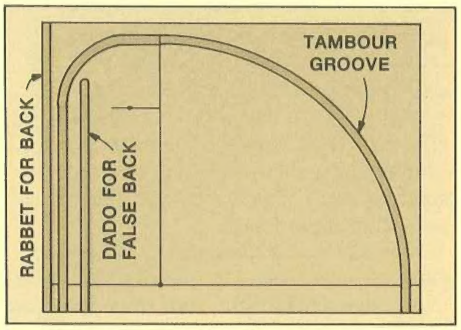
Clean out the groove with a piece of sandpaper wrapped around a small piece of wood. Sand this groove smooth, you don't want anything to hang up the tambour as it slides.

Cut a ¼" - deep groove in both sides. Remember, for the other side, the template will be flipped over, face down. The drawings at right show the sequence of cutting the tambour groove, the stopped dado for the false back, and the rabbet for the back.

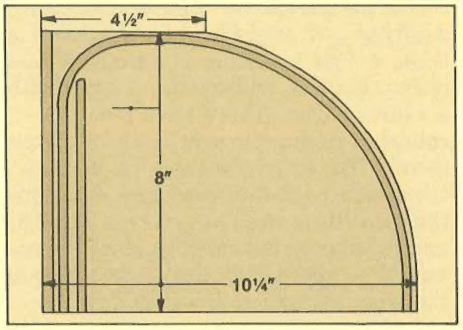




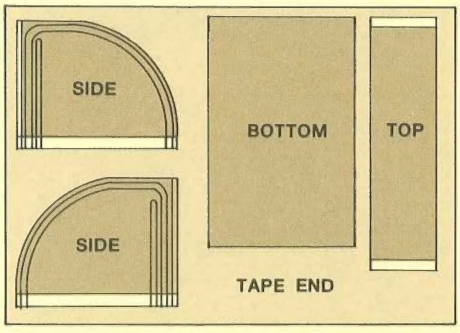
Cut out template. Position on side piece allowing for groove plus ¼" on front edge, and groove plus 3/8" on back edge. Nail in place and route groove.



Cut rabbet on back edge for ¼" plywood back. Cut ¼" dado for false back. (This can be done with router mounted on table.) Sand all grooves and fill nail holes.



Cut side to shape. Front edge is ¼" from tambour groove. A 4½" section on top (for top piece) is flat. Overall width of side is 10¼", height is 8".



Place masking tape over the areas on inside faces of sides, top, and bottom that will be glued after finishing.

THE TAMBOUR TOP

Assembling the tambour top requires yet another jig. First cut the 12 tambour strips out of ¼" x 3/4" screen bead, 16½" long. Give these a *final* sanding before gluing on the canvas.

Make the jig by cutting a ¼" x 3/4" rabbet along the edges of two 1x2s. Mount one of these rabbeted pieces on a particle board base. Then put the 12 strips of screen bead in place and screw the second rabbeted piece to the base. (Make sure the two rabbeted pieces are exactly parallel.)

Nail a piece of screen bead to the back edge of the jig. (Make sure it is exactly perpendicular to the rabbeted side pieces.) Push the 12 tambours (top side down) against the back stop. The tambours have to be tight enough so no glue will seep between them, but not overly tight. (Hand pressure should be good enough. If not, use bar clamps to pull them together.)

When pushing them tight, a second piece of screen bead is placed against the front edge. Once tight, nail the front stop in place.

Now you're ready to glue on the canvas. The canvas I used was medium weight artist canvas (available at art supply stores).

Cut the canvas 15" wide and 10" long. Apply glue (I used *Franklin Titebond)* to three or four tambours at a time, lay the canvas in place, and smooth it down with a veneer roller. (Don't have a veneer roller? A rolling pin will work.) Roll the canvas flat without stretching it, from the middle to the outside edges. Continue this procedure until the canvas is glued and rolled over the entire surface. (There should be about 1" of canvas left over at the front edge.) Let the glue dry overnight.

The lifting bar is a piece of 3/4" x 3/4" cove molding. One edge of the cove molding should be ripped to ½", and both ends need to be trimmed. Glue and clamp the cove molding to the front side, and a 15" piece of screen bead to the back side of the 1" strip of canvas.

There's your tambour top!

FINISHING AND ASSEMBLY

Finishing and assembling are not done in the usual sequence. It's easier to finish the inside surfaces and the tambours before assembly. Do all the finish sanding and then dry clamp all of the pieces together to make sure you have a good fit. The tambour should slide easily in the groove. If it doesn't, sand or trim it so it will.

There are five coats of shellac finish on this bread box. (Five coats! That will take forever. Nope, from beginning to end it's only about 1½ hours.) Dilute "three-pound cut" *white* shellac with denatured alcohol. I used 1/3 cup of shellac to 2/3s cup alcohol. This mixture is about 90% alcohol, and dries, ready to sand, in 15 or 20 minutes.

Apply the shellac with a quality brush, going with the grain and keeping the brush fully loaded. Let it dry, then sand lightly with 400 grit silcon carbide sandpaper. (This will give you a finish as smooth as a baby's bottom.) After finishing the sides, apply two coats of wax in the tambour grooves.

ASSEMBLING THE BOX

I glued and doweled this bread box together, drilling all the way through the outside faces and filling the holes with plugs. But I'm having second thoughts about that. I usually like to see the dowel plugs showing, but in this case I think blind dowel joints would be better.

Anyway, drill the holes to join the sides with the bottom, working around the grooves in the front and back edges of the side pieces. I used 3/8" dowel pins here.

The top is joined to the sides with ¼" dowel pins. The ¼" holes for these pins must be placed only 1/8" from the outer edge. If not, the pins will go through the groove and the tambour won't slide.

When you assemble everything, you have to work fast. I used *Franklin Titebond* which has only a 5-10 minute working time. Get the sides almost in place, leaving them separated a little so you can slip in the tambour top and the false back. (I didn't glue the false back in place. There's really no need to because there's no where for it to go.)

When the sides, bottom, tambour, and false back are in place clamp them loosely and add the top. Then clamp everything tight.

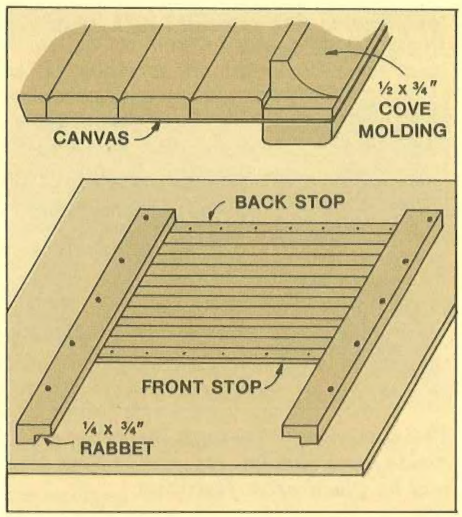
When the glue is dry, cut the back to fit and then complete the finishing work. Again, five coats of shellac, sanding lightly between coats. Since shellac is susceptible to water stains, I gave the *outside* two coats of wax. I didn't wax the inside, the wax would impart an odor to the contents.

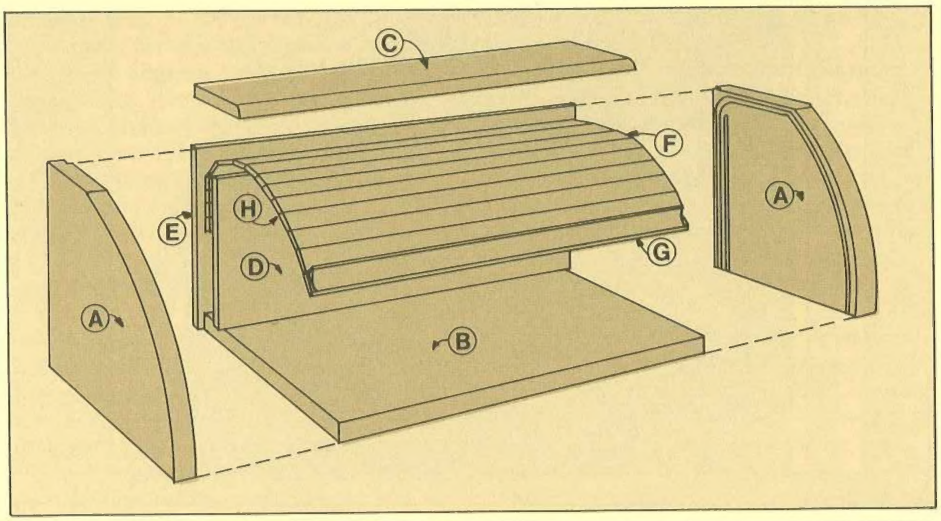
This design could be altered for other projects: slightly smaller it would make a nice jewelry box; larger and longer it could be placed at the back of your desk as a small roll-top add on.

No matter how it's used, it's worth building just to slide the tambour open and closed a few times. Have fun.

MATERIALS LIST

Code	Piece	Dimensions
A	Sides	¾ x 8 - 10¼
B	Bottom	¾ x 10 - 16
C	Top	¾ x 4½ - 17½
D	False Back	¼ x 5¾ - 16½
E	Back	¼ x 8 - 16½
F	Screen Bead	¼ x ¾ - 16½
G	Cove Molding	½ x ¾ - 16½
H	Canvas	10 x 15





Lazy Sam

TOOL STORAGE THAT REVOLVES

I call this my Lazy Sam (rather than Lazy Susan). It sits next to my drill press and holds most of the bits and accessories I use.

Each layer is cut from 2x4s that are edge glued, but if you have some 2x8 scrap you won't have to bother with the edge gluing. The bottom circle is 6" in diameter and the top one is 4" in diameter. Both layers pivot on a ¼" x 4" carriage bolt. One washer under the bottom circle, and one washer in between the layers, allow them to turn freely.

The spacing washers on the bottom and in between the layers work fairly well. The Lazy Sam is not supposed to spin at high speed, just so it turns easily. If you prefer, you can buy an inexpensive 3" Lazy Susan bearing at a hardware store. (It costs about a dollar.)

The base is a 6¼" x 6¼" square of 3/8" plywood. It should be secured to a fixed surface (a workbench or table) with screws so the top will turn independently of the base. Drill a counterbore hole on the bottom side of the plywood base before the ¼" hole is drilled. This counterbore will allow a recess for the head of the carriage bolt so the base can lie flat on the bench. Use a double nut assembly at the top to prevent the nuts from loosening as the Lazy Sam turns.

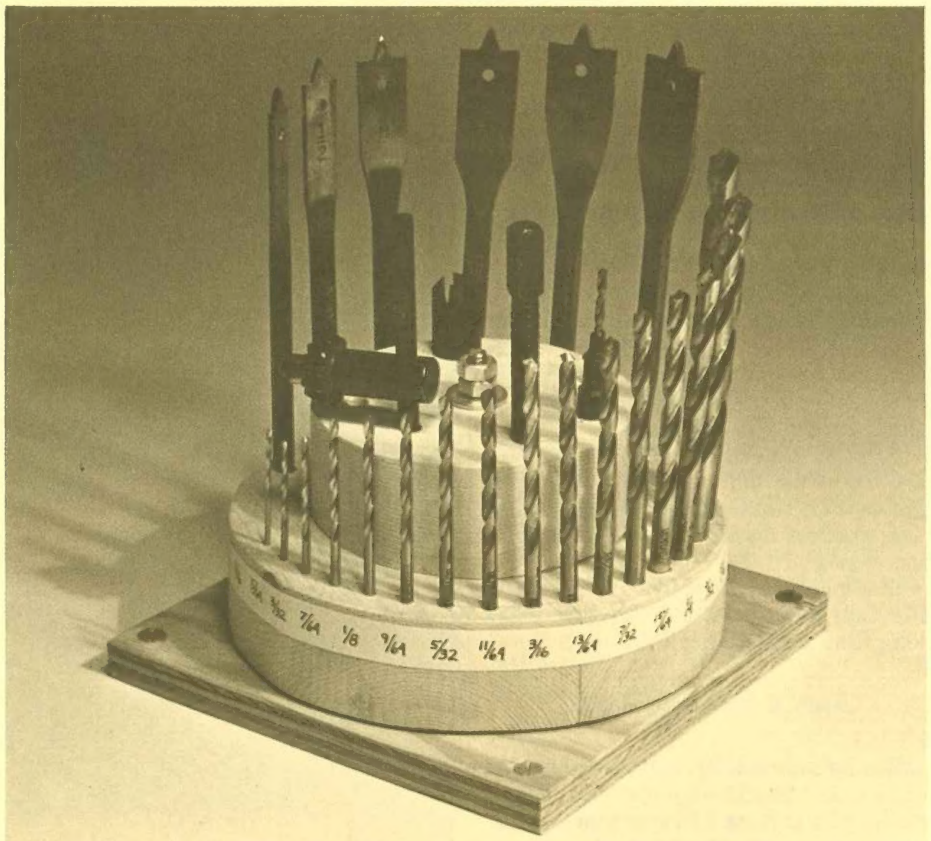
I used a compass (purchased at a store that sells school supplies) to space the holes on the bottom piece. The holes for the twist bits are spaced 10° apart. The holes on the back side and those in the top piece are spaced according to need.

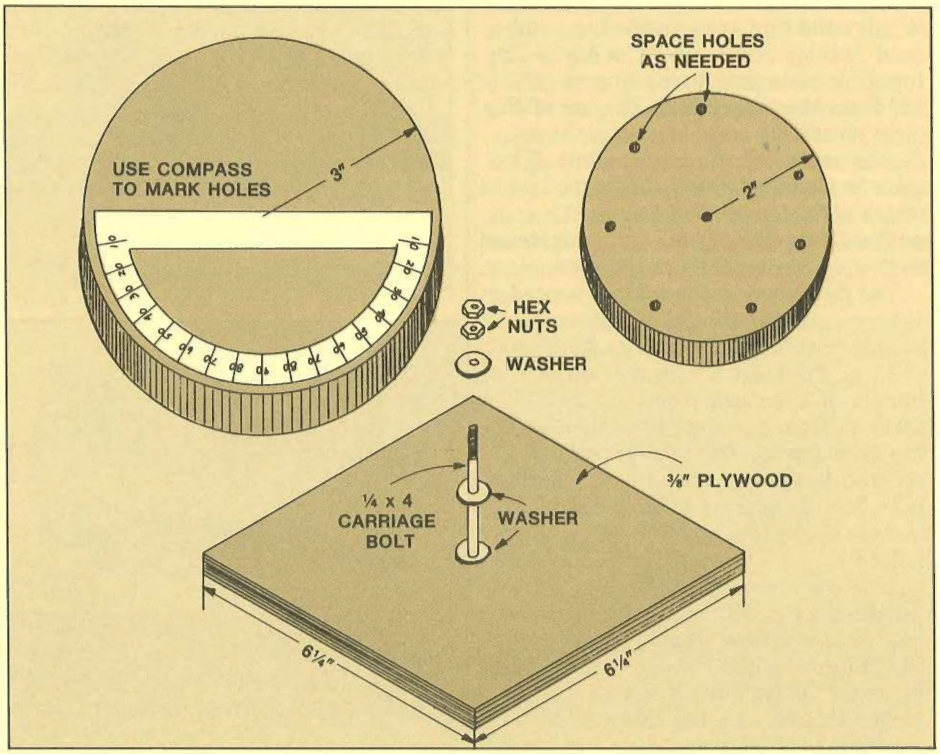
The hole for each twist bit is drilled with the next larger size bit. This works well if your bit index is graduated in 64ths. (If it's less than 64ths, the bits will move around a little, but it will still work.)

Each hole is drilled ½" deep. Since the bits increase in length as they increase in diameter, you have to adjust the depth setting on the drill press each time you drill a new hole. This is kind of a hassle, but worth it to achieve the nice upward slope of the bits. It also makes replacing the bits after use a little easier.

You'll probably want to cut a strip of paper (or use masking tape) to mark the drill bit size beneath each bit.

This type of tool storage adapts to many small tools, and is especially nice in a tool cabinet because it doesn't take up much space, yet allows plenty of storage. You can also make a three-layer Lazy Sam — with the top layer 2" in diameter.





Angle Drilling

THREE JIGS TO KEEP YOU ON COURSE

Drilling holes at an angle requires two things: a way to ensure that the drill bit enters the wood at the proper angle, and the proper bit. I would recommend three types of bits for angle drilling: a brad point bit, a Forstner bit, or a *Stanley Power Bore* bit. (Twist bits have a tendency to "walk", and spade bits "chatter" too much when entering the wood at an angle.)

Brad point bits (available from *Woodcraft* and *Leichtung*) are similar to twist bits except they have a point at the center of the bit to guide it through the hole. These bits are usually available as small as 1/8", increasing in 1/16s.

Forstner bits (Leichtung, Woodcraft) are top of the line bits used for drilling flat-bottom holes and overlapping holes. The smallest diameter I've seen in ½", increasing in 1/8s.

Stanley Power Bore bits are similar to Forstner bits except they have an extra long brad point to guide the bit.

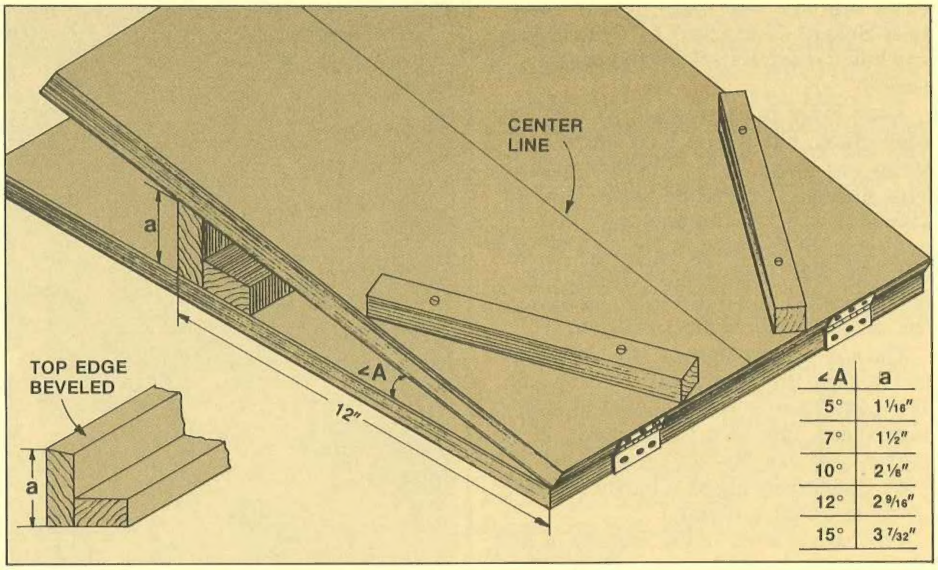
ANGLE DRILLING JIGS

The jig shown at top is intended for use on a drill press. Though many drill press tables tilt, getting them at exactly the proper angle can be a problem.

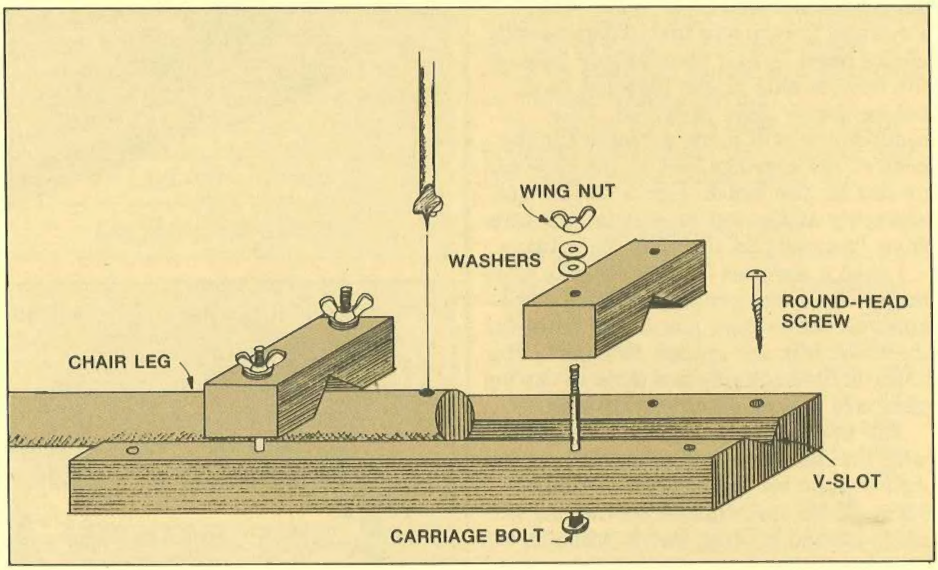
The base and top are 12"x18" pieces of ½" plywood that are hinged at one end. (I used Stanley Hinge 29/32" x 1½".) The top piece rests on a strip of wood exactly 12" from the hinged end. The top of this strip should be beveled at the same degree you want the top to slant. (The table in the illustration shows the height of the strip for several commonly used angles.) Two extra cleats can be fastened to the top to support a round work piece.

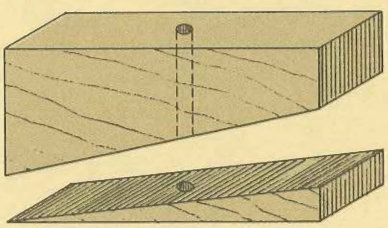
The jig shown in the middle is used in tandem with the top jig. It allows you to secure dowels or turned legs for angle drilling. First cut a V-groove down the middle of 2x4 stock. Then cut 1½" sections from the ends to be used as the top hold-downs. The hold-downs are secured to the bottom with ¼" carriage bolts and wing nuts. (Counterbore the bottom of the 2x4 before drilling the ¼" holes.)

The two drawings at the bottom illustrate a jig used by cabinet makers for hundreds of years. This type of jig is particularly suited for use with portable drills and twist bits. It can be made longer than shown and clamped to the workpiece rather than using screws.

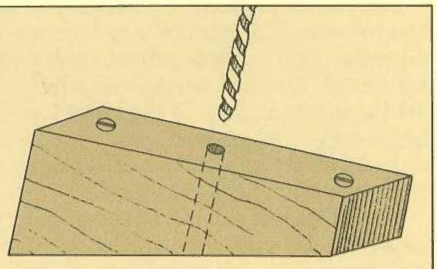


∠A	a
5°	1 1/16"
7°	1½"
10°	2 1/8"
12°	2 9/16"
15°	3 7/32"





Drill a straight hole through a block of hardwood. Cut off bottom of block at desired angle with taper jig. Block works best with twist or auger bits.



Use awl to mark spot to be drilled in workpiece. Slip awl through hole in block and slide around to find spot. Screw or clamp block in place.

Shop Stool

HOW TO ANGLE THE LEGS AND FIT THE RUNGS

Granted, the bar stool shown here is not the fanciest one ever built. (In fact, it's the one I use in my shop.) Since many readers don't have a lathe, I thought I'd build this one with easily obtained materials, and with a minimum of tools.

The legs are made out of closet rod (1¼" diameter) so no turning is required. Of course if you have a lathe and want to turn fancy legs, go to it. But make sure your design allows for the position of all four rungs.

CUTTING AND DRILLING THE SEAT

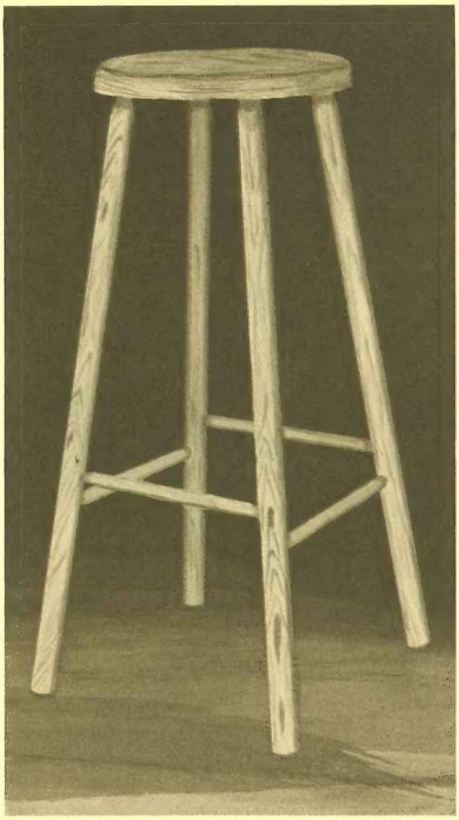
We'll start at the top and work down. I made the seat by gluing some 5/4" x 8" pine and then cut an 11" diameter circle for the seat. (You can use 1½" stock, but I wouldn't go any less than 5/4".) Next I rounded the top edge with a router equipped with a corner round bit and mounted on a table.

Drilling the holes in the bottom of the seat requires a drill press and the angle drilling jig described on the opposite page and shown in use below.

First mark two diameter lines on the bottom of the seat. Extend these lines down the sides and align them with a center line drawn on the jig. I used a 1" Stanley Power Bore bit to drill the holes at a 10° angle, centered 1" from the edge. (You can also cut off a small piece of 1" dowel to use as a template.)

TAPERING AND DRILLING THE LEGS

The legs are cut from 1¼" closet rod, 28" long. The trick is to get a 1¼" leg into a 1" hole. I did it by tapering the ends of the legs. Drill a 1" hole in a thin piece of scrap and use it as a template to draw a 1" diameter circle on the bottom of the leg.



I did the tapering with an often-forgotten, but extremely useful shop tool: the shop knife. Hold it with both hands — one hand on the handle and one on the blade. It's used much like a draw knife, pulling the blade toward you with a smooth, even pull.

This may sound like a lot of hand work, but it goes very quickly. But don't go overboard with the knife, just taper the leg to rough size. Then use a file and a strip of sandpaper to smooth it out. I think this method is faster than mounting the leg in a lathe and turning it. And, there's an advantage over a lathe: If you cut a 1" diameter hole in some 3/4" stock, you can push it on the tapered end and easily gauge both the diameter and length of the taper.

TAPERING AND FITTING THE RUNGS

The holes for the rungs are drilled at the same angle as the holes in the seat bottom. This is done with the aid of the second jig described on the opposite page and shown in use below.

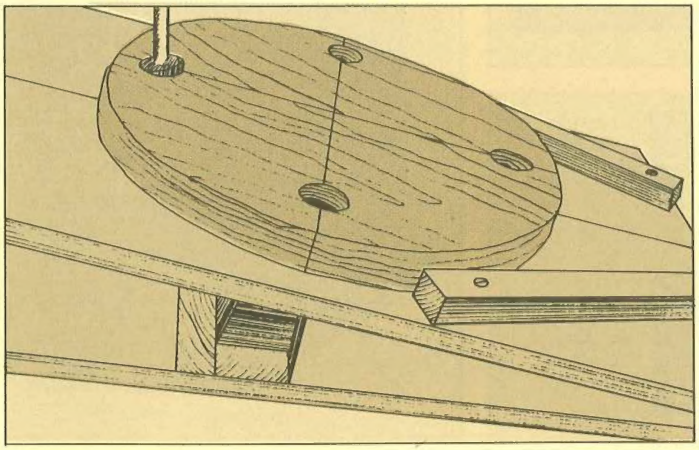
Separate the legs into two pairs, and mark them to prevent confusion. Measure 19" down from the *top* for the bottom set of rungs. Put the leg in the jig with the tapered end pointing up, and drill ½" holes ½" deep on all four legs.

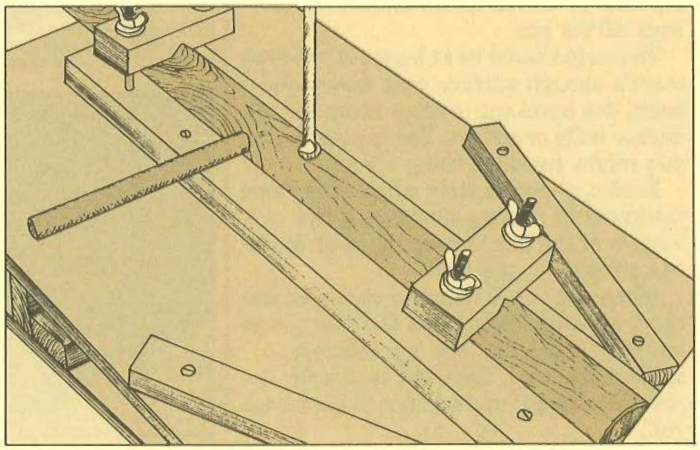
The rungs for these holes are 10" lengths of 5/8" dowel, tapered at the ends to ½". Cut, taper, file, and sand these two rungs and insert them in the holes you just drilled. Now, fit the two pairs of legs in the seat bottom (dry, no glue yet).

Mark the "side" of the legs where the second set of rungs will go. Remove the legs, measure 17½" down from the top, and fasten the legs in the jig. The second set of rungs must be at a 90° angle from the first set, so insert a short length of ½" dowel in the first hole, and revolve the leg until the dowel is parallel to the jig, as shown below.

The second set of rungs should be 9-5/8" long. But put the legs in place and measure to be sure. Cut the second set of rungs to length, and taper the ends.

To assemble, glue the first set of rungs to each pair of legs. Then glue the second set of rungs to *one* pair of legs. Glue these two assemblies together, and glue them into the seat bottom.





Scrap Wood Projects

SCRAP WOOD TOOL HOLDER

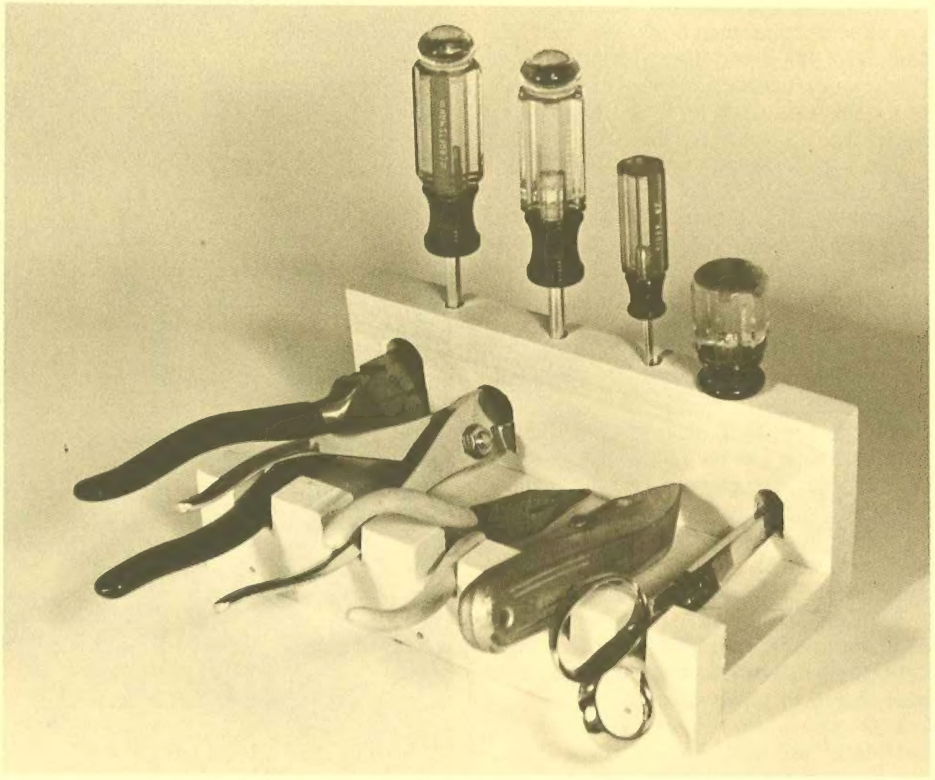
I enjoy building quick and easy projects like this tool holder. They put to good use the scrap wood I can't bear to throw away, and it only takes a few minutes to produce a useful little object.

The nice thing about this tool holder is that it keeps your often-used tools within easy grasp, and prevents them from knocking around in a drawer.

The back and bottom are 9" lengths of 1x4, and the front is a 1x2. It's best to decide what tools you want to store, and then cut the notches in the front piece to fit the tools. Mortices cut in the back allow a comfortable fit for long tools and also help stabilize them. I also drilled holes in the top for screw drivers.

The tool holder shown here was just glued and nailed together. but it's simple little projects like this that afford the opportunity to practice some fancy joinery.

If you have the time and the notion, you might try using dowel joints, or get even fancier with dove-tail joints. If you blow it, it's no big deal. But if it comes out nice, you can impress everyone by showing them that even your simplest tool holder employs fancy joinery.



HANG-IT AND TAKE-IT MOUNTING TECHNIQUE

The technique shown at right is simple yet intriguing. If you look closely at the photo of the router case on page 4, you'll see that I used it on the back of that case.

This technique allows you to securely hang a storage box on a wall, yet remove it easily. To make this hanging device rip a 1x2 strip at a 20° bevel. The bottom half of the strip is then fastened to the wall with anchor bolts, screws, or nails. The top half of the strip is fastened to the back of the box.

The strip should be at least 1½" wide so there's enough surface area above and below the bevel cut to allow room for the anchor bolts or screws. For heavier boxes you might consider using a 2x4.

Fasten a second strip (that's the same thickness as the top one) along the bottom of the box to keep the back of the box parallel to the wall.

When the box is hanging on a wall the bevel automatically locks the two pieces together and holds the box securely against the wall. Removal is simple — just lift straight up and take the box with you.